

## **REMARKS**

The examiner has raised 18 action points which are now individually addressed.

**Point 1:**

No comment required.

**Point 2:**

Claim 76 is intended to be an extension of claim 45 by addition of a gravitational component when the device is used in a vertical plane. Claim 76 has been replaced. Claims 77 and 81 are deleted.

**Point 3:**

Claim 78 - 80 are deleted.

**Point 4:**

Claims 82-83 refer to an alternative use of the device described in claim 45 whereby the device can extract a post by virtue of clamping the elongate object to the ram and reversing the direction of the compression stroke.

Claim 82 is deleted and claim 83 is replaced.

**Point 5:**

Claims 76-77 are dealt with under point 2.

Claims 82-83 are dealt with under point 4.

**Point 6:**

No comment required after consideration of response to point 7.

**Point 7:**

Claim 49 should refer back to claim 46 not 45.

Claim is amended.

**Point 8:**

No comment required after consideration of response to point 9.

**Point 9:**

The Examiner has rejected claims 45-51, 55-56, 71 and 84-85 as being anticipated by Jacquemet (4,799,557).

The main reason for rejection hinges on an understanding of the terms electromagnet and linear induction motor, abbreviated as (LIM.). The author humbly suggests that these terms are well understood by electrical engineers and have distinct meanings that can be gleaned from any authoritative source including that of manufacturers of LIM such as Force Engineering Ltd (UK). The authors understanding as applied to this patent application are summarized thus:

### Electromagnet

- It produces a static magnetic field in a direction dependant on a DC current flow through the coil.
- The static magnetic field only acts on a magnetic or ferromagnetic core.
- When the current is off the core has no stability so in a vertical arrangement it will just fall out, unless mechanically constrained.
- When the current is on the core will seek a stability point, as described:
  1. For a non-magnetized magnetic core it will be equally spaced within the coil i.e. if it is mostly to the left of the coil then it will be pulled into the coil until there is an equal amount either side of the core. The force is small compared to gravity unless extremely high power coils are made which would be impractical to move.
  2. For a magnetized core it will either be attracted away from or into and away from the coil. The force of attraction increases as the core approaches mid way and drops off as a square law away from the coil. The force decreases dramatically.
  3. A magnetized core could not be used in a continuous impact device as the impact would quickly degenerate the magnetization and unless the core was made of an iron alloy it would shatter, thus rendering the device useless as an impact driver.

### Linear Induction Motor (LIM)

- It uses the same concepts as an induction type electric motor which drives rotationally whereas the LIM drives linearly; effectively a rotation of infinite curvature.
- It has a stator which is complex wound coil; the coils are physically arranged to suite the characteristics of the motor.
- It has a reactor whose only requirement is to allow the formation of eddy currents; hence it is not necessarily magnetic but must be electrically conductive.
- The eddy currents are formed in a way which causes repulsion with the magnetic fields of the stator and hence the motor drives. Hence the reference to traveling magnet waves.
- The power and hence current for the stator is 3 phase AC.
- When the motor is started it is in the stalled position i.e. it is not rotating or moving. In the stall position it is least efficient and the effective force to drive the reactor is small.
- As the motor picks up speed the efficiency increases and hence the effective driving force increases.
- The driving force translated into acceleration and hence when the reactor has traveled a distance it accrues velocity that is converted to kinetic energy and hence an impact force.
- The motor has been especially designed by Force Engineering Ltd (UK) to achieve a target velocity that can generate a ton of force on impact over a short distance of 1m using a 20kg weight. The averaged acceleration is ~3 times gravity.

These remarks should make it quite clear that an electromagnet is not a LIM. And that the 2 components are not interchangeable; hence indicating a substantial difference between the patent of Jacquemet and this application. To further summarize, Jacquemet's device relies on gravity alone for an impact force, it can only operate in the vertical plane and it requires DC power; these differences are implicit in claim 45.

On the basis of these remarks, the applicant believes that Jacquemet does not anticipate the use of a LIM and hence claim 45 holds and consequently all other dependant claims 46-51, 55-56, 71 and 84-85.

**Point 10:**

No comment required after consideration of response to point 11.

**Point 11:**

I agree that claims 72-75 are not clear in their purpose which is to ensure that a device is of a sufficiently low height that it can be used in situations of restricted height. However I see no particular advantage in these claims so I have removed them.

**Point 12.**

The Examiner has rejected claims 45-65, 71 and 84-85 as being un-patentable by Martin et al (4,844,661) in view of Rice (4,390,307).

Martin (4,844,661) utilizes an electromagnet to raise a ram and relies on gravity to provide an impulse force in the same manner described by Jacquemet (4,799,557). The same remarks made in point 6 apply to Martin. Quotations from aforementioned patents are provided in double quotes where it helps highlight the remarks.

Martin provides an additional component to provide an initial starting velocity but does not power the ram in any manner throughout its downwards stroke. The abstract of Martin states clearly that the hammer "... drop by gravity onto said anvil..", there is no acceleration arising from the electromagnet "... to lift the hammer.." and "...to communicate an initial starting velocity to said hammer." This latter point is distinctly different from the use of a LIM to accelerate the ram at an increasing rate throughout its movement.

On the basis of these remarks, the applicant believes that Martin has no substance to cause the application to be un-patentable.

Rice (4,390,307) describes a device for the purpose of "...soil penetration is the use of a penetrometer..". Although he makes reference to pile driving his intention is to make soil resistance measurement by using a device that penetrates the soil in a controlled manner.

It is significant that he discounts the use of impulse forces in the domain to which his patent refers "...pile driving devices depend on impulse mechanisms in which much of the impulse energy is wasted.." and "...present methods have difficulty in controlling

penetration rates...”; in conclusion Rice alludes to overcome failings that arise from device that utilize impact forces for the purpose of penetration.

Rice uses a LIM in order to control the speed of penetration and also to maintain a very slow penetration rate ... “to operate at close to standstill conditions...”, this is contrast to the application which requires high speed which by virtue of kinetic energy can be converted into a large impact force. His patent utilizes the LIM in a stall condition quite contrary to the application.. He points this out quite clearly and makes no reference to driving piles through impact but in managing the degree of penetration though controlled speed of penetration. His first claim refers to a non-percussive device.

The principal claim of the application depends on the generation of an impact force arising from the driving the ram at an increasing acceleration to achieve a high impact speed. The applicant considers that these remarks illustrate a quite different domain and method described by Rice and therefore believes that Rice has no substance to cause the application to be un-patentable.

**Point 13:**

In light of earlier remarks Jacquemet (4,799,557) does not anticipate the use of a LIM and hence claim 45 is considered to hold; hence the view of Deike (4,124,081) is discounted.

**Point 14:**

In light of earlier remarks Jacquemet (4,799,557) does not anticipate the use of a LIM and hence claim 45 is considered to hold; hence the view of Rice (4,390,307) and Deike (4,124,081) is discounted

**Point 15:**

The significant differences between an electromagnet and a LIM are described in point 9 and are intended to illustrate that an electromagnet is not LIM. This applies to any comparison with both Jacquemet (4,799,557) and Martin et al (4,844,661).

Claim 45 indicates that the LIM provides a continually increasing rate of acceleration as the ram increases speed. This is a design feature of the LIM in order to obtain a maximum velocity over a prescribed distance of travel. The reference to kinetic energy is intended to highlight the greater impact force obtained by a LIM over and above that of just gravity which provides a constant rate of acceleration. It is well understood that potential energy and kinetic energy are related by well known energy equations.

It is also noted that the application can operate in any plane in and from the horizontal to vertical plane whereas those of Jacquemet and Martin are restricted to the vertical plane by their dependence on gravity; they are also unable to operate in a vertical plane that is opposite to the direction of gravity.

The applicant contends that Rice (4,390,307) does not describe the use of a LIM to accelerate an elongate object or ram but to manage a controlled slow speed of

penetration. Rice actually argues against the use of an impact force; these discussions are covered in point 12.

The acceptance of claim 45 is central to the application and the mounting depends on claim 45 and therefore discounts references to Deike (4,124,081).

**Points 16 -17**

No comment required.

**Additional comment:**

In order to assist review of new claims the following table indicates correlation between previous claims 45-86 and new claims 86-111

<b>Claim No. from OA 1</b>	<b>Claim No. after OA 2</b>	<b>Impact</b>
45	86	Minor changes and additions
46 - 45	87 - 86	Minor change
47 - 46	88 - 87	
48 - 47	89 - 88	
49 - 45	90 - 87	Re-Reference
50 - 45		Deleted, incorporated in claim 86
51 - 45		Deleted, incorporated in claim 86
52 - 45	91 - 86	Minor change
53 - 52	92 - 91	
54 - 52	93 - 91	
55 - 45	94 - 86	
56 - 45	95 - 86	
57 - 56	96 - 95	Minor change
58 - 56	97 - 95	
59 - 45	98 - 86	changes
60 - 45	99 - 86	Minor change
61 - 60	100 - 99	
62 - 60	101 - 99	
63 - 45	102 - 86	
64 - 60	103 - 99	
65 - 45		Deleted as duplication of claim 63
66 - 45	104 - 86	
67 - 66	105 - 104	
68 - 66	106 - 104	
69 - 45	107 - 86	
70 - 69	108 - 107	
71 - 45	109 - 86	
72 - 45		Deleted ( see point 11 of OA 2)
73 - 45		Deleted ( see point 11 of OA 2)
74 - 45		Deleted ( see point 11 of OA 2)
75 - 45		Deleted ( see point 11 of OA 2)

76		Substantially changed
77		Deleted (see point 2 of OA 2)
78 – 45		Deleted (see point 3 OA 2)
79 - 45		Deleted(see point 3 OA 2)
80		Deleted(see point 3 OA 2)
81	110 - 86	Deleted (see point 2 of OA 2)
82	111 - 86	Deleted (see point 4 of OA 2)
83		Substantially changed
84		Deleted as not required
85		Deleted as not required

Based on the forgoing amendments and remarks, it is respectfully submitted that the present application should now be in condition for allowance. A Notice of Allowance is in order, and such favorable action and reconsideration are respectfully requested. However, if after reviewing the above amendments and remarks, the Examiner has any questions or comments, she is cordially invited to contact the undersigned power of attorney.

Respectfully submitted,

  
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